DOCUMENT RESUME

ED 313 220 SE 051 028

AUTHOR Jegede, Olugbemiro J.; Okebukola, Peter Akinsola O.

TITLE Differences in Socio-Cultural Environment Perceptions Associated with Gender in Science Classrooms.

PUB DATE 89
NOTE 14p.
PUB TYPE Reports - Research/Technical (143)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Classroom Environment; Classroom Research; Foreign Countries; Science Education; Science Teachers; Secondary Education; *Secondary School Science; *Sex Differences; Social Environment; *Sociocultural Patterns; *Student Attitudes
IDENTIFIERS *Nigeria

ABSTRACT

An amount of learning outcome variance has been attributed to the environment in which teaching and learning are conducted. The intent of this study was to examine the influence of five aspects of the socio-cultural environment in science classes with particular reference to how these are perceived by boys and by girls. The 30-item Socio-Cultural Environment Scale (SCES) was used to collect data from 707 Nigerian secondary school students in classes four and five (grades 10 and 11 respectively). Authoritarianism, Goal Structure, African Worldview, Societal Expectation, and Sacredness of Science were the five subscales studied. Sex differences were recorded in the Societal Expectation subscale. Most of the female subjects are of the opinion that society has a negative or low regard for their ability to do science and this has an effect on their motivation to undertake science-based careers. The reverse is true for boys. This perception is in agreement with the literature on sex differences in science education and highlights the social pressure that brings about subject preferences. The implications of these findings for science teaching and further research are highlighted. The SCES items are appended and 36 references are listed. (Author/YP)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED313220

DIFFERENCES IN SOCIO-CULTURAL ENVIRONMENT PERCEPTIONS ASSOCIATED WITH GENDER IN SCIENCE CLASSROOMS

OLUGBEMIRO J. JEGEDE
Science Education Section,
Faculty of Education
Ahmadu Bello University,
ZARIA. NIGERIA.

and

PETER AKINSOLA OKEBUKOLA
Department of Curriculum Studies
Faculty of Education
Lagos State University, Apapa
LAGOS. NIGERIA.

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☒ This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY
Olugbemiro J. Jegede

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

SE 051 028

DIFFERENCES IN SOCIO-CULTURAL ENVIRONMENT PERCEPTIONS ASSOCIATED WITH GENDER IN SCIENCE CLASSROOMS

ABSTRACT

An amount of learning outcome variable has been attributed to the environment in which teaching and learning are conducted. Studies carried out so far have however not focused on the socio-cultural aspect of the classroom environment which has been theorized to have potential influence on students' learning. The intent of this study was to examine the influence of five aspects of the socio-cultural environment in science classes with particular reference to how these are perceived by boys and girls.

The 30-item Socio-Cultural Environment Scale (SCES) developed by Jegede and Okebukola (1988) was used to collect data from 707 Nigerian secondary school students in classes Four and Five (grades 10 and 11 respectively). Authoritarianism, Goal Structure, African Worldview, Societal Expectation and Sacredness of Science were the five subscales studied.

Sex differences were recorded in the Societal Expectation subscale. Most of the female subjects are of the opinion that society has a negative or low regard for their ability to do science and this has effect on their motivation to undertake science-based careers. The reverse is true for boys. This perception is in agreement with the literature on sex differences in science education and highlights the social pressure that brings about subject preferences. The implications of these findings for science teaching and further research are highlighted.

THE PROBLEM

The literature accumulated within the past two decades has affirmed the notion that an appreciable amount of learning outcome variance can be attributed to the environment in which teaching and learning are conducted (Fisher, Fraser and Tobin, 1987; Manor, 1987). Consequently, recent proposals for improving students' performance in science have placed particular emphasis on classroom climate - its nature and how it can be structured to facilitate learning.

A promising direction in this line of research is the isolation of those classroom climate variables that exhibit positive relationships with students' performance in different aspects of school learning. Variables that have been described and whose relationships with learning outcomes have been firmly established include teacher support, task orientation, order and organization, rule clarity, teacher control and innovation (Fraser and Fisher, 1986).

The socio-cultural aspect of the environment has, however not received much attention from investigators. This, in the view of Hvifeldt (1986), would appear to be strange for two reasons. First, education, including education in science, has to do with the transmission of the cultural heritage of a people. Second, school learning takes place in a social context and hence interactional variables become critical and noteworthy (Mead,1961). It was in this light that variables which feature in the social and cultural dimensions of the classroom environment have been theorized to affect learning (Bajah, 1975). However, empirical evidence for and against this theoretical position has not been forthcoming (Jegede, 1987). In order to fill this gap in the literature, at least in part, Jegede and Okebukola (1988) prepared a 30-item instrument for assessing the socio-cultural environment in science classes. Subsequently, the instrument was used in large scale studies in Nigeria to find out those variables which influence the socio-cultural environment in science classes as well as how the socio-cultural environment influences learning outcomes in science. The studies were carried out in Nigeria, a predominantly traditional non-western society in which the African mode of thought (often referred to as anthropomorphic) is very dominant. Nigeria is the largest of the 52 African countries and runs what is called a 6-3-3-4 (corresponding to the years spent in the primary-junior secondary-senior secondary and university respectively) system of education. Integrated Science is the only science subject studied in the junior secondary school while the traditional single science subjects of Biology, Physics and Chemistry are taught at the senior secondary level. In one of these studies (Jegede and Okebukola, 1989) it was found that location of school exerted a strong influence on students' perception of the socio-cultural environment. It was further shown that Authoritarianism and African Worldview have strong relationships with students' attitude toward science and their cognitive learning of science concepts (Okebukola and Jegede, 1989).

A particularly stimulating line of research within this context appears to be the examination of boy/girl similarities or differences in perception of the socio-cultural environment. The question as to why girls do not achieve as well as boys in science has long been debated, and is still topical (Wavering, et. al., 1986; Zaerega, et. al., 1986). To date, the debate has generated several studies (as for example by Erickson and

Erickson, 1984; Haggerty, 1987; Johnson and Murphy, 1984, Kahle, 1987; Parker and Offer, 1987; Tobin, 1988) and necessitated major meta-analytical syntheses (Steinkamp and Maehr, 1984; Linn and Peterson, 1986 and Becker, 1989). In addition, several international conferences have been organized on the issue with the Gender and Science and Technology conferences (GASAT) becoming a regular biannual event (the sixth being planned for Australia in 1991).Reasons advanced to explain the gender issues in science education ranged from adoption of different learning styles (Ormerod and Duckworth (1975) to 'differential course taking hypothesis' and subject matter specificity (Parker and Offer, 1987; Becker, 1989). What seemed to have emerged from the literature about the differential achievement, motivation and attitude of boys and girls towards science weighed more heavily toward nurture rather than nature. This makes it tenable to entertain the belief that the perception and influence of socio-cultural factors by, and on the attitude of, students toward science is a major classroom variable that needs to be studied. The fact that the differential in the access of boys and girls to science is social in nature rather than genetic has been explained by Kelly (1981; 1986) in three hypotheses. The first hypothesis is that science is being presented in a way that is somehow not suited to girls, so that change in teaching style or move to single-sex schools could improve girls' achievement. The second hypothesis is attitudinal, implying that girls may perform less well in science because their related attitudes are less positive, so that they enjoy science less, work less hard at it and accordingly achieve less. The third hypothesis is cultural, or the idea that society neither encourages nor expects girls to achieve as well in science. The object of this study, therefore, was to provide some data with regards to the third hypothesis by examining the socio-cultural environment in science classrooms especially at it relates to the subject matter of gender.

Within the subject matter of sociology and culture, significant differences have been observed with respect to boys and girls (Laosa,1979). It is also believed that the examination of an issue on gender differences would be a useful addition to the world-wide quest for strategies and environments that can enhance the access of girls to science related occupations.

Based on an indepth scrutiny of the literature, five subscales or measures of the socio-cultural environment in an African setting were isolated (Jegede, 1987). These are: (1) Authoritarianism i.e. whether or not the individual is allowed to have a mind of his own in the class. This construct also relates to the locus of authority of knowledge resting with the elder. The science teacher, for example, is taken to be the 'know-all' in all matters relating to scientific facts, concepts, principles and laws. (2) Goal Structure - referring specifically to class situations that are predisposing to co-operative, competitive or individual work. This construct focuses on interpersonal relations or student- student interactions in the science class. The three prominent typologies of interaction - cooperative, competitive and individualistic were of interest in this study. (3) African Worldview - relating to traditional belief and superstition. The worldview is an individual's conception of the nature of the universe especially his/her explanations for events and occurrences with the natural world. African worldview is this perception of the world held by the peoples of Africa. (4) Societal Expectation - of peers and family members about science learning and science related occupations. Since the individual operates within a social context, the construct focuses on the expectations of other elements in the society of their members. This expectation is responsible in part for the behaviour of members of the group; and (5) Sacredness of Science - relating to conceptual

interpretations of science. This is a pervasive view held by a large proportion of the African society in which the study of science is seen as something weird, special and requires magical and superhuman explanations. Some even hold the belief that the study of science is above the average inteelligence of someone from a non-western society. These five subscales were pooled to describe the socio-cultural environment that prevailed in the science classrooms in this study.

PURPOSE OF THE STUDY

The purpose of this study was to examine how secondary school boys and girls in Nigeria perceive the socio-cultural environment in their science classes focussing on five subscales of Authoritarianism, Goal Structure, African Worldview, Societal Expectation, and Sacredness of Science.

METHODOLOGY

SAMPLE

Data was collected from a total of 707 junior secondary school science students in Class Four and Five (grades 10 and 11 respectively) randomly drrawn from urban and rural areas of four states of Nigeria. The sample was made up of 470 boys and 237 girls with a mean age of 15.2 years.

INSTRUMENTATION AND PROCEDURE

The Socio-Cultural Environment Scale (SCES) developed by Jegede and Okebukola (1988) was used to gather data on the perception of the students in the sample of the socio-cultural environment prevailing in their science classrooms. SCES (see Appendix) is a 30-item instrument with five subscales on a 3-point (Never, Sometimes, Often) response format. The subscales are Authoritarianism, Goal Structure, African Worldview, Societal Expectation, and Sacredness of Science with each subscale having six items. The development and validation of this instrument, which consisted of the use of a panel of experts of science educators, science teachers, sociologists and anthropologists versed in African studies, have been reported elsewhere (1988). The reliabilities of the measures within each of the five subscales ranged between .72 and .88. The instrument was administered to all the subjects in the sample by five pre-service science teachers in separate testing sessions.

RESULTS

While boys obtained higher mean scores in the subscale of Authoritarianism, the girls had higher mean scores in the subscales of Goal Structure, African Worldview, Societal Expectation and Sacredness of Science as shown in Table 1. The striking feature worth noting also in the differences in the mean scores of the boys and girls was the very high mean difference in favour of the girls in the Societal Expectation subscale. Possible statistically significant gender differences in the mean scores on the five subscales were sought by way of T-test analysis. The t-value for the Societal Expectation subscale was found to be significant ($t=23.90$, $p< .01$). The T-test results are reported in Table 1. The results show that gender differences were evident in the Societal Expectation subscale. This interesting insight into the differential perceptions of boys and girls as regards the Societal Expectation subscale prompted a detailed focus. The subscale was therefore probed further to reveal intra-subscale perception of boys and girls by comparing

the frequency of the responses to each item. The result of this exercise is reported in Table 2. The highlights of the data in Table 2 include: (a) 90% of the girls feel that their friends NEVER expect them to do well in Science (item 19) while almost the reverse is true for the boys; (b) 80% of the boys OFTEN feel that they study science in order to undertake a science-based career in the future (item 22). Only 23% of the girls feel the same way; (c) while only 11% of the girls OFTEN believe that the government is interested in their studying science (item 23), 79% of the boys expressed this belief; (d) 83% of the boys feel that the prestige science enjoys in the society is OFTEN responsible for their studying it (item 24), only 8% of the girls expressed similar view.

DISCUSSION OF RESULTS AND CONCLUSION

The data from this study (see Tables 1 and 2) would seem to suggest that students, irrespective of their gender, perceive the socio-cultural environment of their classrooms in a more or less similar manner. This provides an endorsement for the view that culture is homogeneous for individuals in a homogeneous group (Hvitfeldt,1986). However, sex differences in the perception of the Societal Expectation measure does not support the generalization as the results of this study indicate.

The observed similarity between the boys and the girls in our sample in the perception of the four out of the five socio-cultural measures in their science classes was as expected and could be explained on the basis of the nature of the factors in the SCES. The first factor on the scale is Authoritarianism. It has been well established (Nyerere, 1969; Eshiwani, 1975; Fafunwa, 1967; Ogunniyi, 1987) that the typical African home or school is characteristically authoritarian. Emphasis is on respect for elders and the constituted authority. This is firmly entrenched in the Nigerian tradition for both boys and girls alike. Little wonder therefore why no sex difference emerged in this respect in our study. This may also be the reason why 212 (29%) of the subjects favoured the option 'NEVER' when they responded to the item 'Science students initiate talk during science lessons' on the Authoritarian subscale.

Traditional Worldview, another factor of interest in this study has not been shown to respect gender as an attribute (Ogunniyi, 1986; Okebukola, 1986). In other words, this is a characteristic of the African community that is exhibited by both males and females alike (see Gilbert and Lovegrove, 1972; and Weaver, 1964, for reviews). For example, in response to item 13 on SCES- 'Supernatural forces control events and happenings in the world', 330 (46%) of our subjects (with almost equal distribution of boys and girls) selected the option 'SOMETIMES' and 218 (30%) selected 'OFTEN'.

We recorded highly significant ($p < .01$) gender differences in the Societal Expectation subscale. Several reasons may account for this. One explanation could be that the perception may have been based on the belief that government does not want a prestige status for girls as they are traditionally ascribed a second-rate status in the society (Nwana, 1987). Another reason is that the girls might also have based their perception on the feeling that since only very few women are in government, there is very little representation of their interest that can be made at the top governmental levels regarding any benefit, including that of pursuing careers in science.

A greater percentage of the boys, much more than the girls believed that 'The prestige science enjoys in the society is responsible for studying it' (Item 24). This finding can be due to the influence of certain cultural practices which do not make women look up to any distinguishing or prestige positions. Such practices include enforcement of girls into early marriage and mandatory proscription of married women from public glare (Nwana, 1987) or if they ever appear in public they should not be heard at all. These perceptions are in agreement with the literature on sex differences in science education (Sutherland, 1987). Evidence has been repeatedly found that certain social pressures and inate capabilities influence girls/boys pursuit of science and technology. Science has never been shown to be a 'woman's subject' (Nwana, 1987; Sutherland, 1987). In contrast, the study of the languages and the social sciences is often regarded as being the centre of attraction for female students. In Nigeria, boys are allowed to undertake activities which can promote better perception of science as a career opportunity. They are allowed to climb trees, set traps, go fishing, dismantle mechanical objects, probe valleys, caves and hills, chase butterflies, build models and explore their environment. They are encouraged to make kites and paper air-planes (Nwana, 1987). Girls, on the other hand, are prevented from engaging in risk-prone activities and exploring the environment in the vigorous manner that boys are apt to do. This may explain in part at least, the finding of this study which showed boy-girl differences in students' perception of the socio-cultural environment in their science e classes with respect to societal expectation. Two major implications of the results of this study are discernible. Firstly, the society in demanding more access of girls to science-related occupation, would need to have a re-orientation of the expectation with respect to girls electing to study and do well in science classes. Secondly, as an extension of the study, there is a need for qualitative-interpretive study to further verify some of these hypotheses generated to explain the findings.

REFERENCES

Bajah, S. T. (1975). Preparation of the secondary school science teacher for the African environment. **West African Journal of Education**. 19, 85-96.

Becker, B. J. (1989). Gender and science achievement: A re-analysis of studies from two meta-analysis. **Journal of Research in Science Teaching.** 26(2), 141-169.

Erickson, G. L. and Erickson, L. J. (1984). Females and science achievement: Evidence, explanations and implications. **Science Education**. 68, 63-89.

Eshiwani, G. S. (1975). Sex differences in learning of Mathematics among Kenyan high school students. **Kenya Educational Review**. 2, 111-119.

Fafunwa, B. A. (1967). **New Perspectives in African Education.** Lagos.: Macmillan Publishers.

Fisher, D. L., Fraser, B. J., and Tobin, K. (1987). Using short forms of several classroom environment scales to assess and improve the classroom pyschosocial environment. Paper presented at the 1987 National Convention of NSTA, 26-29, March. Washington, D.C.

Fraser, B. J. and Fisher, D. L (1982). Predicting students' outcomes from their perceptions of classroom psychosocial environment. **American Educational Research Journal**. 19, 498-508.

Gilbert, P. G. J. and Lovegrove, M. N. (eds.). (1972). **Science Education in Africa**. London: Heinemann Educational Books.

Haggerty, S. M. (1987). Gender and science achievement: A case study. **International Journal of Science Education**. 9(3), 271-280.

Hvitfeldt, C. (1986). Traditional culture, perceptual style, and learning: The classroom behaviour of Hmong adults. **Adult Education Quarterly**. 36(2), 65-77.

Jegede, O. J. (1987). Socio-cultural correlates of anxiety in science classrooms: A preliminary report. Paper presented as a contribution to the International Roundtable Exchange at the National Convention of the NSTA. Washington, D.C. 26-29 March.

Jegede, O. J. and Okebukola, P. A. O. (1988). Educology of the socio-cultural factors in science learning. **International Journal of Educology**. 2(2), 70-85.

Jegede, O. J. and Okebukola, P. A. O. (1989). Some socio-cultural factors militating against drift towards science and technology in secondary schools. **Research in Science and Technological Education**. (in press).

Johnson, M. S. (1982). Perception of the social dimension in science classes. **Journal of Teacher Education**. 2, 121-128.

Johnson, S. M. and Murphy, P. (1984). The under-achievement of girls in physics: Towards explanations. **European Journal of Science Education.** 6(44) 399-409.

Kahle, J. B. (1987). SCORES: A project for change? **International Journal of Science Education.** 9(3), 325-334.

Kelly, A. (1981). **The missing half: Girls and science education**. Manchester.: University press.

Kelly, A. (1986). The development of girls' and boys' attitudes to science: A longitudinal study. **European Journal of Science Education.** 8. 399-412

Laosa, L. M. (1979). Inequality in the classroom: Observational research on teacher-student interactions. **Aztlan**. 8, 51-67.

Linn, M. C. and Paterson, A. C. (1986). Emergence and characterization of sex differences in spatial ability: A meta-analysis. **Child Development**. 56, 1479-1498.

Manor, H. (1987). The effects of environment on high school successes. **Journal of Educational Research**. 80, 184-187.

Mead, M. (1961). **The social context of learning**. London.: Oxford Pub.

Nwana, O. C. (1987). Socio-cultural factors in students' pursuit of science and technology. A paper presented at the 28th Annual Conference of the Science Teachers' Association of Nigeria. 17-22 August.

Nyerere, J. K. 91969). **Ujama- essays on socialism**. Dar es Salam.: Oxford University Press.

Ogunniyi, M. B. (1986). Cognitive consequences of traditional cosmology among Nigerian university students. **Educational Perspectives**. 1(2), 66-76.

Ogunniyi, M. B. (1987). **Teaching science in Africa**. Ibadan.: Salem Media.

Okebukola, P. A. O. (1986). Misconceptions of biological concepts. Paper presented at the 59th meeting of NARST, San Fransisco. 29-31 March.

Okebukola, P. A. O. and Jegede, O. J. 1989). Eco-cultural influences upon students' concept attainment in science. **Journal of Research in Science Teaching** (in press).

Ormerod, M. B. and Duckworth, D. (1975). **Pupils' attitude to science.** NFER Publications.: Slough. Berks.

Parker, L. H. and Offer, J. A. (1987). School science achievement: Conditions for equality. **International Journal of Science Education**. 9(3), 263-270.

Steinkamp, M. W. and Maehr, M. L (1984). Gender differences in motivational orientations towards achievement in school science: A quantitative synthesis. **American Educational Research Journal.** 21, 39-59.

Sutherland, M. B. (1987). Sex differences in education: An overview. **Comparative Education.** 23, 5-9.

Tobin, K. (1988). Differential engagement of males and females in high school science. **International Journal of Science Education.** 10(3), 239-252.

Wavering, M. J., Perry, B., and Kelsey, L. (1986). Performance of students in grade six, nine and twelve on five logical, spatial and formal tasks. **Journal of Research in Science Teaching**. 53, 321-333.

Weaver, E. K. (1964). Science education in Nigeria. **Science Education.** 48(4), 351-361.

Zerega, M. E., Haertel, G. D., Tsai, S., and Walberg, H. J. (1986). Late adolescent sex differences in science learning. **Science Education**. 70, 447-460.

TABLE 1

Means, Standard deviations and T-test comparing Boys and Girls on SCES subscales

SUBSCALE		BOYS N= 470	GIRLS N=237	t
AUTHORITARIANISM	Mean	12.23	11.94	0.97
	S.D	4.28	3.49	
GOAL STRUCTURE	Mean	11.46	12.29	2.24
	S.D	3.82	4.95	
AFRICAN WORLDVIEW	Mean	8.91	9.19	1.12
	S.D	2.03	3.92	
SOCIETAL EXPECTATION	Mean	7.21	12.23	23.90*
	S.D	2.19	2.89	
SACREDNESS OF SCIENCE	Mean	6.94	7.02	0.41
	S.D	2.36	2.81	

* $p < .001$

TABLE 2

Frequency of response of Boys and Girls to the Societal Expectation Subscale

	NEVER		SOMETIMES		OFTEN	
	Boys	Girls	Boys	Girls	Boys	Girls
19. My friends expect me to do well in science	19 (4)	213 (90)	47 (10)	19 (8)	404 (86)	5 (2)*
20. Learning science is seen as a special thing	94 (20)	36 (15)	226 (48)	54 (23)	150 (32)	157 (62)
21. My parents take personal interest in my study	0 (0)	7 (3)	183 (39)	97 (41)	287 (61)	133 (56)
22. I study science in order to undertake a science based career in future.	19 (4)	85 (36)	75 (16)	97 (41)	376 (80)	55 (23)
23. I believe the government is interested in my studying science	5 (1)	149 (63)	94 (20)	62 (26)	371 (79)	26 (11)
24.The presitge science enjoys in the society is responsible for my studying it	47 (10)	190 (80)	33 (7)	28 (12)	390 (83)	19 (8)

* Figures in parenthesis give the percentage of boys/girls choosing a response

APPENDIX

SOCIO-CULTURAL ENVIRONMENT SCALE

Instruction: ***Indicate how frequently the following statements apply to you by a tick in the appropriate column.***

	NEVER	SOMETIMES	OFTEN
AUTHORITARIANISM			
1. The science teacher knows all the answers to scientific problems			
2. Students freely express their mind during science lessons.			
3. Students are expected to question the science teacher on what they do not understand.			
4. The African culture emphasizes respect for elders (teachers') point of view.			
5. Science students should be prepared to answer teachers questions.			
6. Science students initiate talk during lessons.			
GOAL STRUCTURE			
7. The spirit of individual competition is encouraged in our science activities.			
8. Students work cooperatively in group during science activities.			
9. The teacher is concerned that everybody understands what he teaches.			
10. The teacher provides projects that encourage cooperative group work.			
11. Traditional games are used as part of science teaching activities.			
12. Group activities assist our learning of science			

AFRICAN WORLDVIEW				
13. Traditional beliefs have scientific explanations.				
14. Traditional beliefs hinder the learning of science.				
15. Supernatural forces control events and happenings in the world.				
16. My parents accept my scientific explanation of natural occurrences like rainbow, rain-making, etc.				
17. What is learnt in science relate to day-to-day life experiences.				
18. Only students brought up by educated parents do well in science.				
SOCIETAL EXPECTATION				
19. My friends expect me to do well in science.				
20. Learning science is seen as a special thing.				
21. My parents take personal interest in my study.				
22. I study science in order to undertake a science-based career in future.				
23. I believe the government is interested in my studying science.				
24. The prestige science enjoys in the society is responsible for my studying it.				
SACREDNESS OF SCIENCE				
25. Science concepts have magical explanations attached to them.				
26. The things I learn in science are strange to me.				
27. The study of science requires special talents.				
28. The science concepts learned at school conflict with what I already believe.				
29. Science can be learned by any willing students.				
30. Only above average Africans should aspire to be scientists.				